A critical appraisal of “Effects Of Menstrual Phase–Dependent Resistance Training Frequency On Muscular Hypertrophy And Strength”

By

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Abstract
This appraisal was done in response to a thorough search for physical therapy interventions that could possibly be used in future practices. The female population undergoes therapy often for an extensive number of reasons. Many of these reasons are due to physiological differences women have. This article had a significant number of strengths but did not correlate with the clinical question in mind. This appraisal listed several potential benefits of training outcomes and the menstrual cycle. The benefits of aligning a menstrual cycle were not emphasized in the article because of the results. Women make up a large percentage of the population and addressing their sex-specific implications can help improve their outcomes by a larger margin. This appraisal emphasizes the importance of knowing the populations therapist work with. It is important to take it a step further and addressing potential problems or solutions to help these populations. The potential problems women have could also be potential solutions.

Key words
Menstrual cycle, females, strength, training, outcomes.

Introduction

Due to anatomical and physiological differences, females can be at an increased risk of injury and adverse therapy outcomes. Until the last few decades, there was not a significant amount of research on the menstrual cycle and its potential effects on a female's athletic performance and outcomes. The menstrual cycle has two phases, follicular and luteal, where estrogen and progesterone hormone levels differ between the two. There are several studies that illustrate the need for more research on the impact of the menstrual cycle. There is some correlation of these hormones demonstrating differences in muscle mass and strength. Some studies have shown a higher incidence of ACL tears during a female's menstrual cycle. Other studies exemplify differences that could potentially hamper a female's performance due to hormonal fluctuations during their menstrual cycle. If there is a deficit in training outcomes due to certain hormonal imbalances, then there should be a way utilize the hormones to improve outcomes. Thus, does aligning a training program to a female's menstrual cycle significantly improve their outcomes? It is important to address all populations in therapy and their specific needs to improve their outcomes.

Methods

Because this topic is not as thoroughly researched as it potentially could be, it was difficult and time-consuming to find articles that addressed physical therapy interventions and the menstrual cycle. Keywords like menstrual cycle, therapy, training, strength, and females were initially used. However, there was not sufficient hits with these keywords. Initially, ten articles were found before reviewing the articles, but after a few hours of searching and reading articles, different keywords were used. This included follicular, luteal, phases, female, resistance training, and injury. With these keywords a significant amount of hits returned that eventually found the

article being appraised. It took ten more hits before reviewing the newly found articles. It took a total of six hours to completely find and review all twenty articles. There was a couple of limitations placed on finding articles. The first was cost, due to financial constraints, articles that cost more than thirty dollars were not chosen. Second, the time frame of the research. Due to the limited research, there was difficulty finding an article that was published in the last fifteen years, and not outdated. PubMed was where the article was found. However, there were several other databases that were searched to find an article that suited the area of interest best. There was another article that was of interest, but due to its cost, it was not feasible.

The article chosen was published in the *Journal of Strength and Conditioning Research* in 2018. The study was done by Sakamaki-Sunaga, Min, Kamemoto, and OkaMoto. The authors are from Nippon Sport Science University in Tokyo, Japan and Korea Institute of Sport Science in Seoul, Korea. The authors have done research on menstrual cycle's effects on females' performance before. They referenced their previous research in this article as well. This article was chosen due to its relevance. The authors focused on the effects of resistance training on different cycles and had valid measures to test these outcomes. Resistance training is an important part of physical therapy interventions and would be helpful to know more about this topic for future practice.

Results

Summary of the study

In this article, the authors researched different resistance training techniques during two phases of menstrual cycles. They measured the effects on skeletal muscle by measuring 1-RM, maximum voluntary contraction, and the cross-sectional area. Their study involved fourteen

eumenorrheic women and included a table with their age, height, weight, BMI, and body fat. All participants have not done any resistance training in at least one year prior to the start of this study. The research conducted between the two phases was done on the same person. During the luteal phase, the researchers measured one arm while the follicular phase measured the opposite arm on the same subject. They did a dumbbell curl and determined the subjects' 1RM by prediction. The researchers measured the maximum voluntary contraction and cross-sectional area every four weeks as well as the 1-RM. They measured each of these during the follicular phase and the luteal phases of the menstrual cycle. During the research, the measured the energy and nutrient intake of the participants as well. A baseline was established. In their statistical analyses, they used ANOVA with the ability to factor in all their dependent variables. The results ultimately did not show a significant correlation or relationship to prove their hypothesis. The outcomes measured did not show significant impacts of the two different phases.

Appraisal of the study introduction

This article's introduction was very detailed and gave an extensive amount of background information. It led with describing the muscle mass effects on the females' body and implications of hormones. The introduction was specific on the hormones that were considered and used this to describe what was going to be researched. The introduction discussed a previous study done by the researchers and discussed the correlation between the two, which helped significantly.

The article's introduction did not have many weaknesses. Many of the described effects in the introduction were based on outdated and several were on rats. The dates from these articles were from the 1990s and 1980s.

Appraisal of the study methods

The methods of this study had several strengths of strengths. In the article, the people who surveyed the participants' exercise were professional trainers. This was helpful for the participants to ensure accuracy of the exercises. The research assessed all the outcomes in the same way for all the participants. This was consistent for all subjects and tests. This research did not have any withdrawals. They had 14 physically active eumenorrheic women in this study. The participants need to not have trained in regular resistance training program for over a year. They were all non-smokers and not on birth control. These women also could not have given birth before. They also must've been free of any diseases or disorders for this study. They did not specify how they found the women to have an average menstrual cycle of about 29 days with only 1 day of deviation. This study was experimental and prospective.

A few weaknesses were present in the methods. The length of menstrual cycle and the phases were measured using basal temperatures and not any blood serums. This could cause potentially less accurate menstrual synchronization. The participants all came in when they could so this was inconsistent way to gather information. There was not much over the requirements of the women. The study was not blinded, but the arms that were worked out were randomly assigned since one side worked out during one phase, but the other side worked out during another phase.

Appraisal of the study results

The results had strengths that allowed it to be easier to read and comprehend. They reported all outcome measures. They described the muscle contraction results based off the two menstrual phases briefly. They also described the results for cross-sectional areas taken, referencing their tables and figures as well. They are presented in an order that makes sense for the results. The measurable outcomes were all in one table. Table 3 was very helpful in showing the results of the

study. This study showed muscle cross-sectional area of the elbow flexor increase was significant at the of the follicular phase training and luteal phase training. Their changes correlated significantly and similarly in both phases.

The results did not go directly with the introduction and methods. They did not specifically address the question researched. The outcomes measured were not in a clear order like listed in the methods either. The results listed the energy and nutrient intake first despite it being listed last in the methods and showed no intake difference. Figure 1 had a lot of information to process on one single figure. It could have been split up or better since it had a lot of shapes and symbols that were similar.

Appraisal of the study discussion

The discussion of this study had several strengths. It went into detail about the meanings of their findings and gave us practical applications. Their results were small and concise two paragraphs while the discussion was seven paragraphs long. They directly listed their aim of the study in the first paragraph. They used literature to tie into their findings and describe its significance. The second paragraph described the importance of the nutrition intake and lack of emphasis on it. They suggested further research to address the implications of only studying the arms. It makes sense for them to study more since one muscle group is not reflective of another. The study listed the limitations.

They did seem a little bias about their findings indicating they wanted to do further research since their findings did not correlate with other literatures and their previous research.

Discussion

This article did not make a strong argument for the intervention appraised. A training program could still be aligned and still be helpful in outcomes. There were no contraindications listed by

the article. Since the research was limited to upper extremities, that did not mean it would not work for lower extremities. This study does not improve the use of aligning a cycle to a training program. The article did list potential benefits for further research, however.

Because menstrual cycle affects mental and physical condition of female athletes, studying this topic more would be relevant to see if it affects their outcomes. This article could potentially help in a clinic since there was increase during both phases. However, it did not emphasize the alignment of a menstrual cycle to a patient. I could not apply this to practice since the results of the study stated increase the same in both phases. If one of the phases had a stronger outcome, this could have been used more in a clinic to help female clients improve their outcomes significantly. They only measured arm strength on the same person and did not accurately measure the menstrual phases and the hormones. They could have used a more accurate way to measure the menstrual cycles. With this article alone, I could not directly apply it to practice, but would keep in mind since it had no contraindications against it.

This article showed significant effort to demonstrate the potential for an improved outcomes in females. The article was methodically thought out. Throughout the article, there were consistent strengths. The literatures used for the articles were from credible sources that helped emphasized the relevancy of this research. It had the physiological composition of females in mind and was evident in both the introduction and discussion. The results did not correlate with the hypotheses. However, this research article was well composed and had little weaknesses and in many cases were addressed by the authors themselves.